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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/736,480	12/15/2003	Zhigang Qi	10964-065001	3469
26161	7590	09/05/2006	EXAMINER	
FISH & RICHARDSON PC P.O. BOX 1022 MINNEAPOLIS, MN 55440-1022			CHUO, TONY SHENG HSIANG	
			ART UNIT	PAPER NUMBER
			1745	

DATE MAILED: 09/05/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

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<b>Office Action Summary</b>	<b>Application No.</b>		<b>Applicant(s)</b>	
	10/736,480		QI ET AL.	
	<b>Examiner</b>		<b>Art Unit</b>	
	Tony Chuo		1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 13 July 2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-23 and 33-39 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-23 and 33-39 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12/15/03 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |                                                                                         |                                                                             |
|-----------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)             | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____                                                |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____                                                             | 6) <input type="checkbox"/> Other: _____                                    |

## **DETAILED ACTION**

### ***Response to Amendment***

1. Claims 1-23 and 33-39 are currently pending. Claims 24-32 have been cancelled. New claims 34-39 have been added. The objection to the specification is withdrawn. Claims 1-23 and 33-39 do not overcome the previously stated 102 and 103 rejections. Therefore, claims 1-23 and 33-39 stand rejected under the following 112, 102, and 103 rejections.

### ***Claim Rejections - 35 USC § 112***

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 1-2, 18, and 33 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. It is unclear what the symbol "/" is referring to.

### ***Claim Rejections - 35 USC § 102***

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

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5. Claims 1-3, 5-6, 11-12, 18-23 and 33-39 are rejected under 35 U.S.C. 102(e) as being anticipated by Barton et al (US 2003/0157397) as evidenced by Kiefer et al (US 2005/0084727). Regarding claims 1-3, 5-6, 18, and 33-39, the Barton reference teaches a fuel cell comprising a first fuel cell flow plate "16"; a second fuel cell flow plate "16"; an electrolyte membrane "6" between the first and second fuel cell flow plates; a diffusion layer "1","5" that is carbon paper, between the first fuel cell flow plate and the electrolyte wherein the carbon paper is treated with SO<sub>3</sub>H Nafion which is a sulfonic acid moiety (See paragraphs [0057],[0064],[0065],[0087],[0100], [0101] and Figure 2). The Kiefer reference teaches sulfonic acid groups that are covalently bonded to cation exchange membranes such as Nafion membranes (See paragraph [0006]). Since sulfonic acid groups are covalently bonded to carbon atoms in Nafion, there's no evidence to show that sulfonic acid groups are not covalently bonded to the carbon atoms in the carbon paper that is treated with SO<sub>3</sub>H Nafion solution.

Regarding claims 11 and 12, it teaches an electrolyte membrane that is a proton conducting material comprising a perfluorinated sulfonic acid (See paragraph [0086]).

Regarding claims 19-22, it teaches a fuel cell system where the fuel cell utilizes fuels in liquid or gaseous phase such as hydrogen or organic fuels (See paragraph [0054]). Therefore, the fuel cell is either a proton exchange membrane, direct feed liquid, direct alcohol, or direct methanol.

### ***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Barton et al (US 2003/0157397) as evidenced by Kiefer et al (US 2005/0084727). The Barton reference is applied to claims 1-3, 5-6, 11-12, 18-23 and 33-39 for reasons stated above. However, the reference does not expressly teach an article where R is an aryl substituted with halogen or an alkyl moiety. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Barton diffusion layer to include an aryl substituted with halogen because the substitution of an aryl for alkyl was held to be obvious (Ex parte Koster 136 USPQ 75 (PO BdPatApp 1963)).

8. Claims 7-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barton et al (US 2003/0157397) as evidenced by Kiefer et al (US 2005/0084727) in view of Yasumoto et al (US 2003/0198860). The Barton reference is applied to claims 1-3, 5-6, 11-12, 18-23 and 33-39 for reasons stated above. However, the reference does not expressly teach a diffusion layer that comprises a platinum catalyst where the diffusion layer comprises 1 to 50 wt% of the catalyst. The Yasumoto reference does teach a diffusion layer that comprises a platinum catalyst where the diffusion layer comprises 1 to 50 wt% of the catalyst (See Example 1 on page 6). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Barton fuel cell to include a diffusion layer that comprises 1 to 50 wt% of the catalyst so that the process of making the diffusion electrode can be simplified.

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9. Claims 10 and 13-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barton et al (US 2003/0157397) as evidenced by Kiefer et al (US 2005/0084727). The Barton reference is applied to claims 1-3, 5-6, 11-12, 18-23 and 33-39 for reasons stated above. However, the reference does not expressly teach an aqueous permeability of the article that is greater than the aqueous permeability of the diffusion layer, an article that has an initial contact angle with water that is at least 40% less than the initial contact angle with water with the diffusion layer, or an article that has an initial contact angle with water that is less than 125° and at least 20° less than the initial contact angle of water with the diffusion layer. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Barton diffusion layer to include an article that has an initial contact angle of water that is at least 40% less than the initial contact of water with the diffusion layer, less than 125°, and at least 20° less than the initial contact angle of water with the diffusion layer because the parameter optimized was recognized in the art to be a result effective variable since initial contact angle is a result of the hydrophilicity of the diffusion layer (In re Boesch, 617 F2d 272, 205 USPQ 215 (CCPA 1980)). In addition, it is well known in the art that the Nafion solution used to treat the carbon paper increases the hydrophilicity of the diffusion layer such that the aqueous permeability of the article is greater than the aqueous permeability of the untreated diffusion layer.

10. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Barton et al (US 2003/0157397) as evidenced by Kiefer et al (US 2005/0084727) in view of Takeda et al (US 2001/0031387). The Barton reference is applied to claims 1-3, 5-6,

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11-12, 18-23 and 33-39 for reasons stated above. However, the reference does not expressly teach a direct propanol fuel cell. The Takeda reference teaches a fuel cell system that uses other type of hydrocarbon fuels such as propanol (See paragraph [0052]). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Barton fuel cell to include a direct propanol fuel cell because both methanol and propanol are alcohols that can be easily transported and used as fuel in a fuel cell.

### ***Response to Arguments***

11. Applicant's arguments filed 7/13/06 have been fully considered but they are not persuasive. In response to the applicant's argument that Barton's sulfonic acid moieties are not covalently bonded to the gas diffusion backing, there is no evidence showing that Barton's carbon paper treated with SO<sub>3</sub>H Nafion solution does not contain sulfonic acid moieties covalently bonded to the carbon paper. In fact, the carbon paper treated with SO<sub>3</sub>H Nafion is baked in an oven at 300°F for 2 hours (See paragraph [0101]). Although the Barton reference does not expressly teach a chemical reaction between the sulfonic acid moieties and the carbon paper, it is implicit from the teachings that the sulfonic acid moieties are covalently bonded to the carbon paper. In addition, claims 1, 18, and 33 do not preclude the addition of Nafion because of the "comprising" language.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tony Chuo whose telephone number is (571) 272-0717. The examiner can normally be reached on M-F, 8:30AM to 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

TC

  
PATRICK JOSEPH RYAN  
SUPERVISORY PATENT EXAMINER